

Non-Toxic, Low Freezing, Drop-in Replacement Heat Transfer Fluids, Phase II

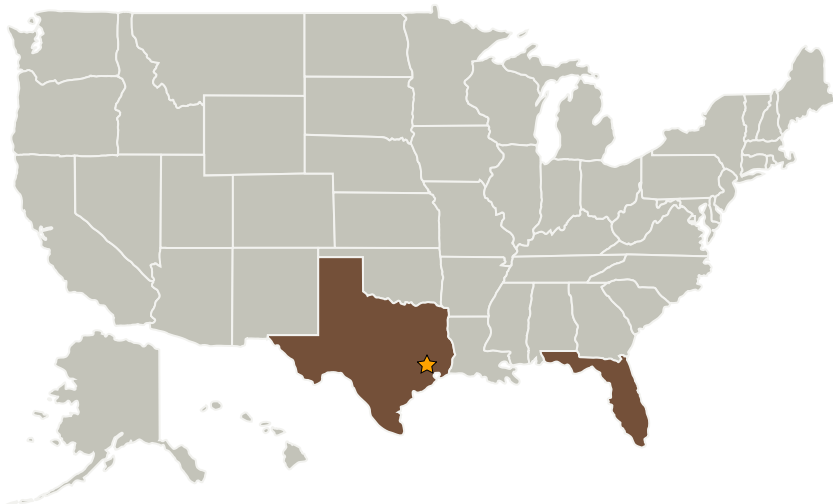
Completed Technology Project (2005 - 2007)



Project Introduction

Drop-in heat transfer fluids replacements for ITCS and EVA suits were down-selected and characterized in Phase I for various metrics including density, heat capacity, viscosity, freezing point, freezing expansion, toxicity, NFPA rating, flash point, materials compatibility, heat transfer coefficients, and several Figures of Merit related to heat transfer, pressure drop, and pump work. Optimized solutions had freezing points of about -30 C and freezing volume expansions 50%-75% less than water. The toxicity of the fluids is predicted to be "low" and also compatible with SS, BNi-2, PTFE and pEVA. The heat transfer Figures of Merit were 75-100 relative to water ("100"), and better than propylene glycol and organic heat transfer fluids. The pump work metric was only about 60% higher than water. We also identified a superior pH buffering agent to compensate for CO₂ absorption and demonstrated a biocide "package" to prevent any microbial growth. The Phase II effort will optimize and comprehensively characterize these fluids (including toxicity), perform life testing, and deliver fluids to NASA at the end of the project.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Mainstream Engineering Corporation	Supporting Organization	Industry	Rockledge, Florida

Primary U.S. Work Locations

Florida	Texas
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.2 Electric Space Propulsion
 - └ TX01.2.4 Electrothermal